

What is claimed is;

1. A surface position detection device for detecting a surface position of a detection target surface, comprising;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, wherein:

        the surface position of the detection target surface is detected based upon an output from said light-receiving system.

2. A surface position detection device for detecting a surface position of a detection target surface, comprising;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

        the surface position of the detection target surface is detected based upon an output from said light-receiving system.

3. A surface position detection device according to claim 2, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

4. A surface position detection device for detecting a surface position of a detection target surface, comprising:

    a projection system that projects a light flux from a diagonal direction onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher, wherein:

    the surface position of the detection target surface is detected based upon an output from said light-receiving system.

5. A surface position detection device according to claim 4, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

6. A surface position detection device for detecting a surface position of a detection target surface, comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; and

the surface position of the detection target surface is detected based upon an output from said light-receiving system.

7. A surface position detection device according to claim 6, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

8. A surface position detection device for detecting a surface position of a detection target surface, comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and is constituted of a low-dispersion optical material with an Abbe number of 65 or higher; and

the surface position of the detection target surface is detected based upon an output from said light-receiving system.

9. A surface position detection device according to claim 8, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

10. A surface position detection device for detecting a surface position of a detection target surface, comprising:

    a projection system that projects a light flux from a diagonal direction onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface, and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

    said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through

which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, with the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or more and less than 45°; and

the surface position of the detection target surface is detected based upon an output from said light-receiving system.

11. A surface position detection device according to claim 10, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

12. A surface position detection device for detecting a surface position of a detection target surface comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a

second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, with the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or more and less than 45° and is constituted of a low-dispersion optical material with an Abbe number of 65 or higher ; and

the surface position of the detection target surface is detected based upon an output from said light-receiving system.

13. A surface position detection device according to claim 12, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

14. A surface position detection device for detecting a surface position of a detection target surface, comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the

detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, wherein:

the surface position of the detection target surface is detected based upon an output from said detection unit.

15. A surface position detection device for detecting a surface position of a detection target surface, comprising;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

the surface position of the detection target surface is detected based upon an output from said detection unit.

16. A surface position detection device according to claim 15, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

17. A surface position detection device for detecting a surface position of a detection target surface, comprising;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher, wherein:

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the surface position of the detection target surface is detected based upon an output from said detection unit.

18. A surface position detection device according to claim 17, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

19. A surface position detection device for detecting a surface position of a detection target surface, comprising;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

— a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which

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the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; and

the surface position of the detection target surface is detected based upon an output from said detection unit.

20. A surface position detection device according to claim 19, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

21. A surface position detection device for detecting a surface position of a detection target surface, comprising;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the

secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and is constituted of a low-dispersion optical material with an Abbe number of 65 or higher; and

the surface position of the detection target surface is detected based upon an output from said detection unit.

22. A surface position detection device according to claim 21, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

23. A surface position detection device for detecting a surface position of a detection target surface, comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is

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transmitted, with the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or more and less than 45°; and

the surface position of the detection target surface is detected based upon an output from said detection unit.

24. A surface position detection device according to claim 23, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

25. A surface position detection device for detecting a surface position of a detection target surface, comprising;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not

parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, wherein:

said prism includes a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, with the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or more and less than 45° and is constituted of a low-dispersion optical material with an Abbe number of 65 or higher; and

the surface position of the detection target surface is detected based upon an output from said detection unit.

26. A surface position detection device according to claim 25, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

27. A surface position detection device for detecting a surface position of a detection target surface, comprising:

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors, wherein:

the surface position of the detection target surface is detected based upon an output from said light-receiving system.

28. A surface position detection device according to claim 27, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

29. A surface position detection device for detecting a surface position of a detection target surface, comprising;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the

secondary image of the specific pattern formed via said condenser optical system;

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors; wherein

the surface position of the detection target surface is detected based upon an output from said detection unit.

30. A surface position detection device according to claim 29, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

31. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux; to detect the surface position of the detection target surface is based upon an output from said light-receiving system; and

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

32. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not

parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other; to detect the surface position of the detection target surface is detected based upon an output from said light-receiving system; and

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

33. An exposure apparatus according to claim 32, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

34. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not

parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said light-receiving system and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

35. An exposure apparatus according to claim 34, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

36. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

    a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection

surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; to detect the surface position of the detection target surface based upon an output from said light-receiving system and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

37. An exposure apparatus according to claim 36, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

38. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface is detected based upon an output from said light-receiving system and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

39. An exposure apparatus according to claim 38, wherein:  
said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

40. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light

flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45°; to detect the surface position of the detection target surface is detected based upon an output from said light-receiving system and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

41. An exposure apparatus according to claim 40, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

42. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection

optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45° and said prism is constituted of a low-dispersion optical material with an Abbe number of 65 or greater; to detect the surface position of the detection target surface based upon an output from said light-receiving system and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

43. An exposure apparatus according to claim 42, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

44. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

    a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

45. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the

secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

46. An exposure apparatus according to claim 45, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

47. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection

optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

48. An exposure apparatus according to claim 47, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

49. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said

first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

50. An exposure apparatus according to claim 49, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

51. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate

relative to said projection optical system based upon results of a detection performed by said surface position detection device.

52. An exposure apparatus according to claim 51, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

53. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

    a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

    a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

    a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

    a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection

surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted and the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45°; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

54. An exposure apparatus according to claim 53, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

55. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing a light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said

first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45° and said prism is constituted of a low-dispersion optical material with an Abbe number of 65 or greater; to detect the surface position of the detection target surface based upon an output from said detection unit and;

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

56. An exposure apparatus according to claim 55, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

57. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

58. An exposure apparatus according to claim 57, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

59. An exposure apparatus that performs projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a surface position detection device that detects a surface position of the pattern surface at the mask or an exposure target surface of the photosensitive substrate relative to said projection

optical system as a surface position of a detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system;

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors; to detect the surface position of the detection target surface based upon an output from said detection unit; and

a means for alignment that aligns the pattern surface at the mask or the exposure target surface of the photosensitive substrate relative to said projection optical system based upon results of a detection performed by said surface position detection device.

60. An exposure apparatus according to claim 59, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

61. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

62. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

63. An exposure method according to claim 62, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

64. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

65. An exposure method according to claim 64, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

66. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection, provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, with said prism having a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the

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light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

67. An exposure method according to claim 66, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

68. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

69. An exposure method according to claim 68, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

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70. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and the

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angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45°; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon the results of a detection performed in said detection step.

71. An exposure method according to claim 70, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

72. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection

surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45° and said prism is constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon the results of a detection performed in said detection step.

73. An exposure method according to claim 72, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

74. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned

relative to said projection optical system based upon results of a detection performed in said detection step.

75. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux which includes a prism having a pair of reflection surfaces that are not parallel to each other; to detect the

surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

76. An exposure method according to claim 75, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

77. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the

secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

78. An exposure method according to claim 77, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

79. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

80. An exposure method according to claim 79, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

81. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

82. An exposure method according to claim 81, wherein:

    said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

83. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising;

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second

reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45°; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

84. An exposure method according to claim 83, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

85. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a prism having a pair of reflection surfaces that are not parallel to each other, a first transmission surface through which the incident light flux is transmitted, a first reflection surface at which the light flux having been transmitted through said first transmission surface and propagated through the inside of said prism is reflected, a second reflection surface at which the light flux having been reflected at said first reflection surface and propagated through the inside of said prism is reflected along an optical path intersecting the optical path of the light flux having been transmitted through said first transmission surface and a second transmission surface through which the light flux having been reflected at said second reflection surface and propagated through the inside of said prism is transmitted, and the angle formed by said first reflection surface and said second reflection surface set within a range of 40° or greater and less than 45° and said

prism is constituted of a low-dispersion optical material with an Abbe number of 65 or higher; to detect the surface position of the detection target surface based upon an output from said detection unit; and an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

86. An exposure method according to claim 85, wherein:

said prism is constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

87. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

— a projection system that projects a light flux from a diagonal direction onto the detection target surface;

— a light-receiving system that receives a light flux having been reflected at the detection target surface; and

— a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not

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parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors; to detect the surface position of the detection target surface based upon an output from said light-receiving system; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

88. An exposure method according to claim 87, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

89. An exposure method for implementing projection exposure of a pattern formed at a mask onto a photosensitive substrate via a projection optical system, comprising:

a detection step in which the surface position of a pattern surface of the mask or an exposure target surface of the photosensitive substrate relative to said projection optical system is detected as a surface position of a detection target surface by employing a surface position detection device that detects the surface position of the detection target surface and includes;

a projection system that projects a light flux from a diagonal direction onto the detection target surface and includes a projection optical system provided to form a primary image of a specific pattern onto the detection target surface;

a light-receiving system that receives a light flux having been reflected at the detection target surface and includes a condenser

optical system provided to form a secondary image of the specific pattern by condensing the light flux having been reflected at the detection target surface and a detection unit provided to detect the secondary image of the specific pattern formed via said condenser optical system; and

a means for light flux deflection provided, at least, either in an optical path of said projection system or in an optical path of said light-receiving system and having an even number of reflection surfaces to allow an incident light flux to exit at an angle that is not parallel to the incident light flux, which includes a pair of reflection mirrors that are not parallel to each other and holding members each provided to interfit with and hold one of said pair of reflecting mirrors; to detect the surface position of the detection target surface based upon an output from said detection unit; and

an alignment step in which the pattern surface of the mask or the exposure target surface of the photosensitive substrate is aligned relative to said projection optical system based upon results of a detection performed in said detection step.

90. An exposure method according to claim 89, wherein:

said holding members are constituted of an optical material having a coefficient of thermal expansion equal to or lower than 1 ppm/K, which does not expand readily in heat.

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